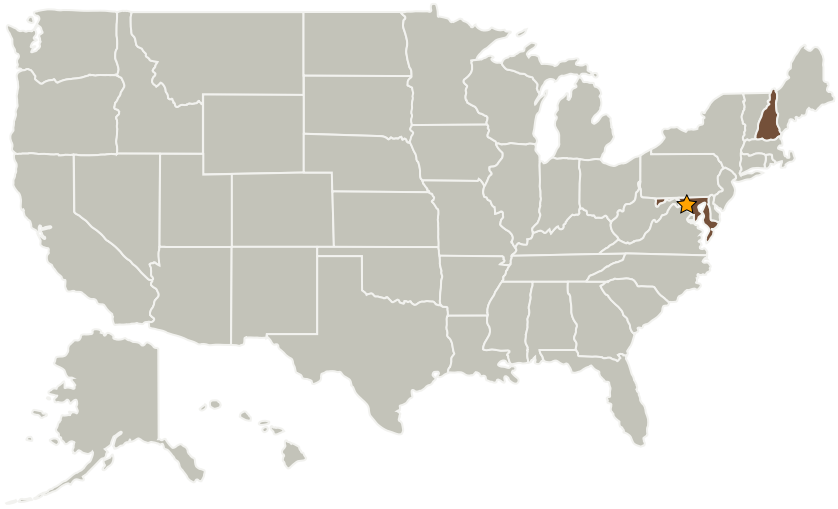
The Affordable Pre-Finishing of Silicon Carbide for Optical Applications, Phase II

Completed Technology Project (2009 - 2012)

Project Introduction

Large aperture, lightweight optical mirror technologies are critical for the future of lightweight telescopes and their attendant missions to explore the planets in our solar system and beyond. Chemical vapor deposition (CVD) coated silicon carbide (SiC) has been shown to be a viable alternative for lightweight mirrors due to its thermal stability; however, cost-effective manufacturing techniques to pre-finish this material have not been sufficiently developed. During the Phase I project, we established the feasibility of the low-rate step of our hybrid machining approach by successfully completing ductile-regime machining (DRM) of CVD SiC. We were able to produce a surface that had a roughness of a near-optical quality. We established key partnerships that will enable the development of the high rate machining step and demonstrated that our hybrid machining approach will reduce the cost of fabricating a finished mirror by up to 46% when compared with the current state-of-the-art. During the Phase II project, we will work further to develop our hybrid machining process, demonstrate it on a large scale optic, and deliver it to NASA.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Creare LLC	Supporting Organization	Industry	Hanover, New Hampshire

Primary U.S. Work Locations	
Maryland	New Hampshire

Project Transitions

February 2009: Project Start

February 2012: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.4 Manufacturing
    - TX12.4.3 Electronics and Optics Manufacturing Process